CLAIMS

1. An optical displacement sensor comprising a source of optical radiation, an array of radiation detectors, at least one modulating element having alternating first and second modulating regions circumferentially spaced around a central axis of the element, the first and second regions having different optical characteristics and the transition between adjacent first and second regions being defined by a substantially radially extending edge, the modulating element being displaceable relative to the array of detectors so that the first and second regions are exposed to optical radiation from the source and pass by the detector array to form an image of said first and second regions of the modulating element on the array,

a data processor connected to the detector array to receive therefrom respective signals dependent upon the radiation falling on the detectors, and characterised in that:

the detector array comprises a two-dimensional array of detector elements which produces a two-dimensional image of the first and second regions;

the processor is adapted to identify the orientation of at least two different radially extending edges of regions on the at least one modulating element from the two-dimensional image and to determine the position of the centre of the element from the determined orientation of the edges.

2. An optical displacement sensor according to claim 1 in which the modulating element includes a third modulating region that is distinct from the first and second modulating regions.

3. An optical displacement sensor according to claim 1 or claim 2 in which the processor is adapted to identify in the two dimensional image at

least two radially spaced portions of each identified edge from the image captured by the detector array.

4. An optical displacement sensor according to claim 3 in which the processor is adapted to determine the orientation of a detected edge by generating a vector which passes through the two identified portions.

5. An optical displacement sensor according to any preceding claim in which the two dimensional array comprises two sub-arrays with each sub-array comprising a linear array of detector elements.

6. An optical displacement sensor according to claim 5 in which the spacing between the detectors of the two sub-arrays is smaller than the angular spacing between the edges that are to be identified.

7. An optical displacement sensor according to claim 5 or claim 6 in which each sub-array is adapted to generate a respective sub-image which is passed to the processor, each of the two sub-images corresponding to a different portion of the first and second regions.

8. An optical displacement sensor according to any one of claims 5,6 or 7 in which the sub-images are captured at the same instant in time, or at substantially the same instant in time.

9. An optical displacement sensor according to any preceding claim in which the processor comprises means for identifying the orientation of the edges by identifying the position of an inner portion of a first edge of the modulating regions in the first image and the position of an outer portion of the first edge in the second image,

means for identifying the position of an inner portion of a second edge of the modulating regions in the first image and the position of an outer portion of the second edge from the second image,

orientation determining means for determining the orientation of the two edges from the relative positions of the portions in the first and second images; and

position determining means for determining the position of the centre of the modulating element from the determined orientation of the two identified edges.

10. An optical displacement sensor according to claim 9 in which the processor is adapted to determine the centre of rotation of both of the first and the second elements by identifying the orientation of at least two edges on each of the elements.

11. An optical displacement sensor according to any preceding claim in which each first region of the first and second modulating elements comprises a radially extending slot formed between circumferentially spaced radially extending edges.

12. An optical displacement sensor according to claim 11 in which the second regions between the slots are opaque.

13. An optical displacement sensor according to any preceding claim in which the spatial extent of the two-dimensional array is such that, in use, at least five transitions between first and second intensity thresholds will always be detectable by each array.